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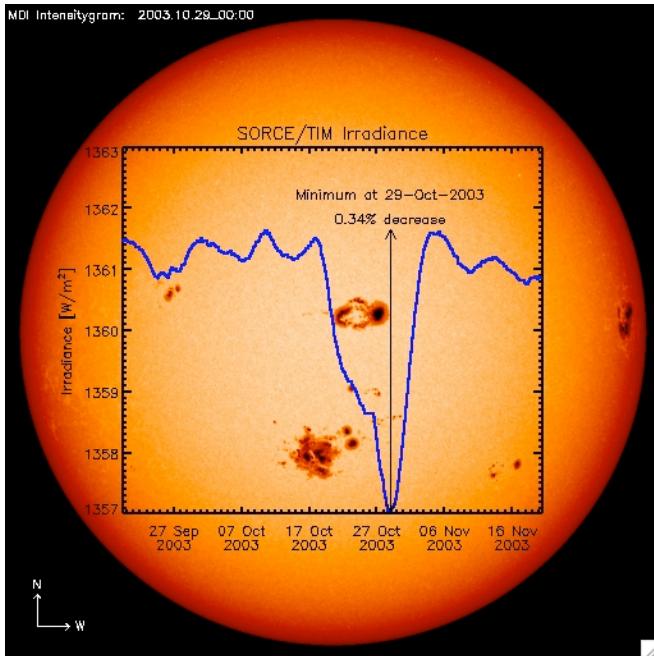
Solar Radiation and Climate Experiment Monthly Newsletter

July 2006

TIM and the Solar Surface –

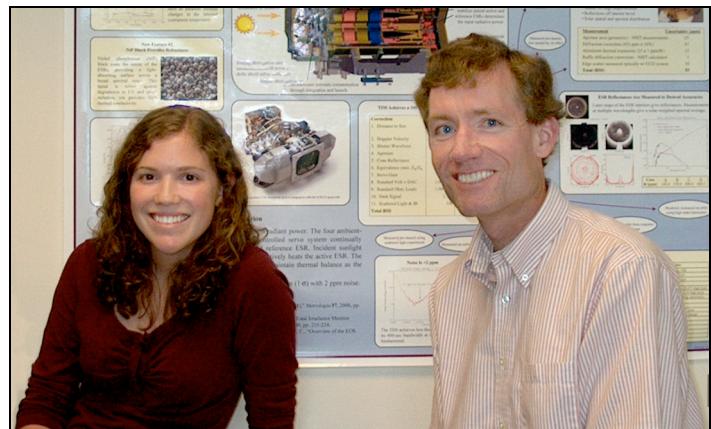
LASP student Lucy Logan has created a movie showing dynamic fluctuations on the solar surface and the corresponding changes in the total solar irradiance (TSI) measured by SORCE's TIM instrument.

The video (click below on the Sun) shows the growth, rotation, and decay of the extremely large sunspot groups on the Sun's surface during the three-month period of September to November 2003. This period was marked by the appearance and evolution of two particularly active regions which emitted the first and fourth largest X-ray flares ever recorded by NOAA's GOES spacecraft. The unusually active Sun emitted over 140 flares during this period, including 11 X-class flares, primarily from these two regions. The TSI dropped by an unprecedented 0.34% over a few days with the growth of these large, dark sunspots, which were some of the largest ever observed. The sunspots formed and transited the solar disk, reaching a minimum on October 29th and caused the largest short-term TSI decrease in the 28-year TSI record.



LASP student Lucy Logan created this video by animating a series of intensity images recorded by the Solar & Heliospheric Observatory. A graph of the TIM TSI data up to the time of each image is juxtaposed in front of each frame of the movie. Click on the image above to see the movie.

Having just graduated from high school, Lucy is happy to be back working at LASP for the summer before she heads off this fall to start her freshman year at Colorado College. She learned about LASP through family friend Greg Kopp, as the two have been slalom kayak training together since 2001. This is Lucy's second summer at LASP, where she has been focusing her efforts on helping the Calibration group characterize Glory TIM cone reflectance uncertainties. She also worked on an Education and Public Outreach project building miniature earth globes with SORCE models, which are used to demonstrate to grade- and middle-school students the variability of the Sun and the necessity of using a satellite above the Earth's atmosphere to accurately measure solar irradiance.



Greg Kopp, TIM instrument scientist, and Lucy Logan have been working together on TSI data. We hope Lucy will be back to work with LASP for many future summers! Everyone enjoys and appreciates her curiosity and enthusiasm.

SSI & Climate Modeling Workshop

Just a reminder that on Wednesday, **August 9, 2006**, the LASP SORCE science team is hosting a one-day workshop to address "**SORCE Solar Spectral Irradiance Needs for the Modeling Community**".

This workshop will focus on the needs of users of SORCE SSI data, and will include climate, atmosphere, and radiative transfer models. This informal gathering is meant to encourage discussion on issues related to the requirements for the SSI in a variety of applications. After a brief overview of SSI measurements and their variability, climate and atmospheric models will be introduced as well as identifying the primary SSI data users and their

requirements for SSI. The goal is to determine improved SSI data products to meet the needs of the modeling community.

The workshop will begin at 9:00 a.m. at LASP, 1234 Innovation Drive, Boulder. Please RSVP to Vanessa George at vanessa.george@lasp.colorado.edu.



Update on SOLSTICE A Entrance Aperture Anomaly –

By Marty Snow, LASP, University of Colorado

We are continuing to study the effect of the anomaly that occurred on January 26, 2006 in the SOLSTICE A entrance slit. On that day, two commands to change from the stellar aperture to the solar aperture did not cause the mechanism to operate. A third command finally did cause the mechanism to move to the proper position. The decision was then made to leave SOLSTICE A in solar mode until further analysis could be completed. Some of that analysis is described below. The executive summary is that the entrance aperture is now displaced about 4 arc minutes from where it was before the anomaly, and the decision to stop moving it was the right one.

We can measure the location of the entrance aperture in three different ways. The most straightforward is to use the weekly alignment maneuvers. During these observations, the spacecraft points 5.5 degrees off the sun, then steadily moves across the solar disk and out to 5.5 degrees on the other side. From the instrument's point of view, the sun moves steadily into, through, and then out of its field-of-view. The center of the FOV has moved by about 4 arc minutes relative to where it was prior to the anomaly.

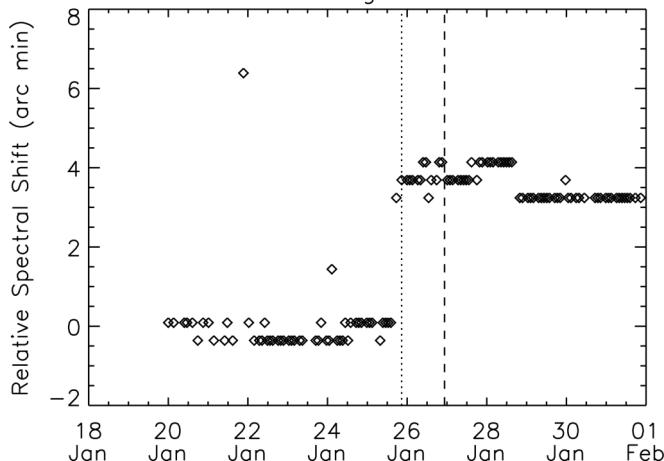
The second way to measure the location of the aperture is to use the Solar Position Sensor (SPS) that is mounted on the aperture housing. The SPS is a made up of four diodes. The relative amount of sunlight falling on each quadrant measures the position of the Sun quite well. This information is telemetered to the ground with every science packet. The SPS measurements also show a shift, but with an interesting twist.

The electronic control units (know as GCIs) of all the SORCE instruments are monitored every orbit for latch-up conditions, and the GCIs are reset if this occurs. These latch-ups are predominately caused by energetic protons when the spacecraft passes the South Atlantic Anomaly region. This monitoring process is

called SPaM (Static Packet Monitor). There was a SPaM reset on (January 26th, 8:39 UT) to clear a GCI lockup and the aperture was displaced from then on. Note that the mechanism exchanged solar and stellar slits as usual for the rest of the day.

The third method for determining the position of the entrance aperture uses the observed spectrum. A displacement of the aperture causes a shift in the wavelength scale. Starting after the SPaM reset in the 25th, the wavelength scale also shows a shift of about 4 arc minutes. The figure below shows the position of the Si II line at 180.8 nm relative to its pre-anomaly position.

Wavelength Shift



Displacement of entrance aperture measured by shift of spectral feature. This plot shows the relative position of the Si II line at 180.8 nm during late January 2006. The scatter in the points before (or after) the anomaly is normal. The mean grating position of this emission feature clearly changed on January 25th, and has remained in this new position ever since.

Since all three methods yield consistent results, we are very confident that the entrance aperture really is displaced from its normal position. The fact that this displacement started before the anomaly on the 26th indicates that something is physically preventing the mechanism from moving normally rather than a one-time glitch in the electronics or some other non-repeatable event. With that in mind, we do not plan on ever moving the SOLSTICE A entrance aperture again, since it is currently in a state that does not reduce our science at all. SOLSTICE B continues to make the stellar irradiance measurements, and the degradation of SOLSTICE A can be tracked using cross-calibration between the two instruments.

231,416
Hits to the SORCE Website
(Since 4/21/03, As of 7/21/06)

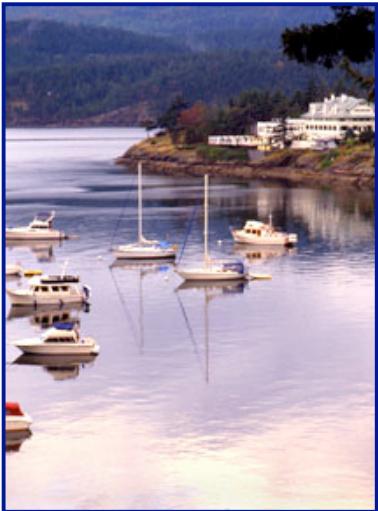
2006 SORCE Science Meeting – Hotel/Registration Deadlines Extended

**September 20-22
San Juan Islands, Washington**
Hotel Deadline: Aug. 4
Registration Deadline: Aug. 4

Register for the SORCE Meeting, ***Earth's Radiative Energy Budget Related to SORCE***, on-line today! Complete meeting information is available at – <http://lasp.colorado.edu/sorce/2006ScienceMeeting/>.

The hotel reservation deadline and the pre-registration (\$240) deadline have been extended to **August 4**.

The final program and abstracts will be on the SORCE meeting website by mid August. Between the great science program and the magnificent setting, you won't want to miss the 4th Annual SORCE Meeting!



Upcoming Meetings / Talks – **SORCE scientists plan to present papers or attend the following 2006 meetings:**

American Meteorological Society 12th Conference on Atmospheric Radiation, July 10–14, Madison, WI
SSI and Climate Modeling Workshop, August 9, LASP, Boulder, Colorado
EUFAR (EUropean Fleet for Airborne Research) Workshop on Combining Satellite Missions and Aircraft Activities: Future Challenges for the EUFAR Fleet, Sept. 13-15, Paris, France
SORCE Science Meeting, Sept. 20-22, San Juan Islands, WA
Coimbra Solar Physics Meeting, “The physics of chromospheric plasmas,” Oct. 9-13, Coimbra, Portugal

To submit information to this newsletter, please contact:
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